

What is claimed is:

1. A method for making a magnetic sensor for a disk drive read head,

the method comprising the steps of:

5 fabricating a giant magnetoresistive stack on a surface of a layer of bottom shield material, the giant magnetoresistive stack including an etch stop layer positioned on an end of the giant magnetoresistive stack opposite the surface of the wafer and a buffer layer positioned on the etch stop layer;

depositing an insulating material on the giant magnetoresistive stack and the surface of the layer of bottom shield material;

10 planarizing the insulating material to form a top surface of the insulating material lying in a plane adjacent to or passing through the buffer layer;

etching the buffer layer; and

15 depositing a top shield layer on the insulating material and the giant magnetoresistive stack, the top shield layer making electrical contact with the giant magnetoresistive stack.

2. A method for making a magnetic sensor for a disk drive read head according to claim 1, wherein the step of planarizing the insulating material is performed using chemical machining polishing.

20 3. A method for making a magnetic sensor for a disk drive read head according to claim 1, wherein the step of planarizing the insulating material is performed using a vacuum etch process.

36 4. A method for making a magnetic sensor for a disk drive read head according to claim 1, the method further comprising the steps of:

25 etching the etch stop layer prior to the step of depositing a top shield layer on the insulating material and the giant magnetoresistive stack.

5 4. A method for making a magnetic sensor for a disk drive read head according to claim 1, wherein:

30 the insulating material comprises a material selected from the group of Al_2O_3 , AlN , AlON , SiO_2 , SiN and SiON .

6 5. A method for making a magnetic sensor for a disk drive read head according to claim 1, wherein:

the etch stop layer comprises a material selected from the group of Au, Cu, NiFe, CoFe, NiCoFe, Al₂O₃, and Ta.

5 7. A method for making a magnetic sensor for a disk drive read head according to claim 1, wherein:

the buffer layer comprises a material selected from the group of Ta, W, Ti, Cu, SiO₂ and SiN.

8. A magnetic sensor made in accordance with the method of claim 1.

10 9. A method for making a magnetic sensor for a disk drive read head, the method comprising the steps of:

20 fabricating a giant magnetoresistive stack on a surface of a layer of bottom shield material;

15 depositing an insulating material on the giant magnetoresistive stack on the surface of the layer of bottom shield material;

depositing a self-planarizing material on the insulating material;

25 planarizing the self planarizing material and the insulating material using a vacuum etch process that removes the self planarizing material and the insulating material at the same rate until a surface of the insulating material lies in a plane adjacent to an end of the giant magnetoresistive stack; and

depositing a top shield layer on the insulating material and the giant magnetoresistive stack.

10. A method for making a magnetic sensor for a disk drive read head according to claim 8, wherein:

25 the insulating material comprises a material selected from the group of alumina, SiO₂, SiN.

11. A method for making a magnetic sensor for a disk drive read head according to claim 8, wherein:

30 the self-planarizing material comprises a material selected from the group of a spin on glass and a photo resist.

12

14. A magnetic sensor made in accordance with the method of claim 8.

13

12. A method for making a magnetic sensor for a disk drive read head, the method comprising the steps of:

5 fabricating a giant magnetoresistive stack on a surface of a layer of bottom shield material, the giant magnetoresistive stack including an etch stop layer positioned on an end of the giant magnetoresistive stack opposite the surface and a buffer layer positioned on the etch stop layer;

10 depositing an insulating material on the giant magnetoresistive stack and the surface of the layer of bottom shield material;

15 depositing a self-planarizing material on the insulating material;

planarizing the self-planarizing material and the insulating material using chemical machining polishing to form a top surface of the insulating material lying in a plane adjacent to or passing through the buffer layer;

20 etching the buffer layer; and

depositing a top shield layer on the insulating material and the giant magnetoresistive stack, the top shield layer making electrical contact with the giant magnetoresistive stack.

14

13. A method for making a magnetic sensor for a disk drive read head according to claim 12, the method further comprising the steps of:

25 etching the etch stop layer prior to the step of depositing a top shield layer on the insulating material and the giant magnetoresistive stack.

15

14. A method for making a magnetic sensor for a disk drive read head according to claim 12, wherein:

the insulating material comprises a material selected from the group of

25 Al_2O_3 , AlN, AlON, SiO_2 , SiN and SiON.

16

15. A method for making a magnetic sensor for a disk drive read head according to claim 12, wherein:

the etch stop layer comprises a material selected from the group of Au, Cu, NiFe, CoFe, NiCoFe, Al_2O_3 , and Ta.

17 16. A method for making a magnetic sensor for a disk drive read head according to claim 12, wherein:

the buffer layer comprises a material selected from the group of Ta, W, Ti, Cu, SiO₂ and SiN.

5 18 17. A magnetic sensor made in accordance with the method of claim 12.

19 18. A method for making a magnetic sensor for a disk drive read head, the method comprising the steps of:

10 fabricating a giant magnetoresistive stack on a surface of a layer of bottom shield material;

depositing a self-planarizing material on the giant magnetoresistive stack on the surface of the layer of bottom shield material;

15 planarizing the self planarizing material using a vacuum etch process that removes the self planarizing material until a surface of the self planarizing material lies in a plane adjacent to an end of the giant magnetoresistive stack; and

depositing a top shield layer on the self-planarizing material and the giant magnetoresistive stack.

20 19. A method for making a magnetic sensor for a disk drive read head according to claim 18, wherein:

the self-planarizing material comprises a material selected from the group of a spin on glass and a photo resist.

21 20. A magnetic sensor made in accordance with the method of claim 18.